ASTRONOMY

Image Converter Used

Telescopes in Flagstaff, Ariz., test simple device that photographs stars electronically. Scientists are now checking an improved version of the device.

➤ A SIMPLE DEVICE to photograph stars electronically has been used successfully on telescopes in Flagstaff, Ariz.

An improved version is being tested by scientists at the Carnegie Institution in Washington. Called an image converter, the device will be shipped to Flagstaff soon for making stellar and planetary photographs on an experimental basis.

The image converter, developed and built by Radio Corporation of America, has military as well as astronomical applications. It is also being tested by physicists at the University of Michigan and elsewhere for photographing the path of high-energy nuclear particles passing through a scintillation counter.

Dr. W. K. Ford Jr. of Carnegie told SCIENCE SERVICE that the improved image converter represents about a half-way point in the astronomers' goal of electronically amplifying starlight.

The eventual aim is to make a 20-inch telescope the equivalent of a 200-inch for some purposes. The device does not require auxiliary vacuum equipment as does the thin-film type of image converter, which is also under development.

In view of the discoveries made during the last 50 years with large telescopes, routine use of image converters, when perfected, may bring discoveries requiring mankind to reconsider the universe.

The RCA image converter is a six-inch-long tube that receives the starlight at one end, which is attached to the eyepiece of the telescope. The light is then intensified internally by electronic means and displayed at the other end where it can be photographed.

The tube has been used on both the U. S. Naval Observatory's 40-inch reflector and Lowell Observatory's 24-inch refractor. On the 40-inch, an exposure time of only two minutes allowed photographing stars of the 18th magnitude. Direct photographs of the same region showed stars of only 16.5 magnitudes.

The light gain of the RCA image converter is actually considerably greater than these figures would indicate. One of the problems, graininess of the phosphor film, is now believed licked.

When used on the 24-inch telescope, the same type of tube gave successful images of Mars in a three-hundredth of a second, one-tenth of the usual exposure time. However, no clearer details were seen than with direct photography, it is reported in *Sky and Telescope* (March).

The continuing experiments with image converters are being conducted by Drs. Ford and M. A. Tuve, director of Carnegie's Department of Terrestrial Magnetism, John S. Hall, director of Lowell Observatory, and William A. Baum of Mount Wilson and Palomar Observatories, operated jointly by Carnegie and California Institute of Technology.

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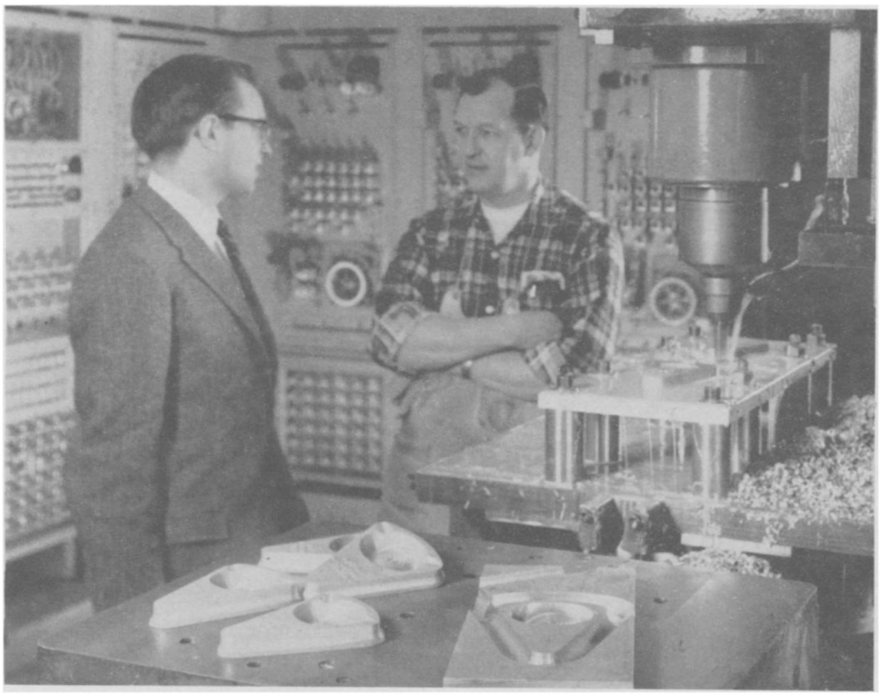

AUTOMATIC CONTROL—The milling machine above is cutting out a metal part under the APT system while two members of M.I.T.'s Servomechanisms Laboratory chat in the background. Clarence Feldmann, left, research assistant, and Gordon Phinney, machinist, have no need to check the machine as it follows its prescribed course which has been automatically planned by a digital computer. Pieces in the foreground have already been turned out by the machine.

TECHNOLOGY

Computer Gives Orders To Automatic Machines

➤ A LONG STEP forward in the automatic control of machines was seen in development of a method for preparing the necessary instructions with an electronic computer.

The system, known as APT for Automatically Programmed Tool, can increase the productive capacity of all U. S. industries. Using it, a high-speed digital computer can calculate the numerical information necessary to determine the motions an automatically controlled machine must make in cutting metal parts for aircraft, missiles or other products.

Key to the system is a relatively simple, English-like language with which a human operator can communicate descriptions of the required parts and how they should be cut directly to the giant computer.

The language, designed primarily for convenience of humans, can be translated and understood by the computer. It permits those with no knowledge of computers to control complex calculations and is placed in a general purpose computer's "memory" by way of punched cards.

Numerical control for automatic machine tools has now been adopted by many plants throughout the country, but a bottleneck developed in preparing instructions for such tools. APT is aimed at solving this problem.

The system allows a designer to conceive a part, turn over his rough sketches to a draftsman who makes a detailed drawing. An outline of the general machining sequence to be followed by the cutting tool is then made by a programmer in the APT language. When fed into a computer with APT instructions in its "memory," the directions are transformed into the numerous detailed instructions required to produce the part by an automatically controlled machine.

The APT system was developed at the Massachusetts Institute of Technology Servomechanisms Laboratory, Cambridge, Mass., in research sponsored by the Air Force's Air Materiel Command. An industrial version of the method was produced for 19 aircraft plants. Future development to improve and expand the system will be under direction of the Aircraft Industries Ass'n.

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